

15¢

U.S. \$3.00 A YEAR

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



RECEIVED

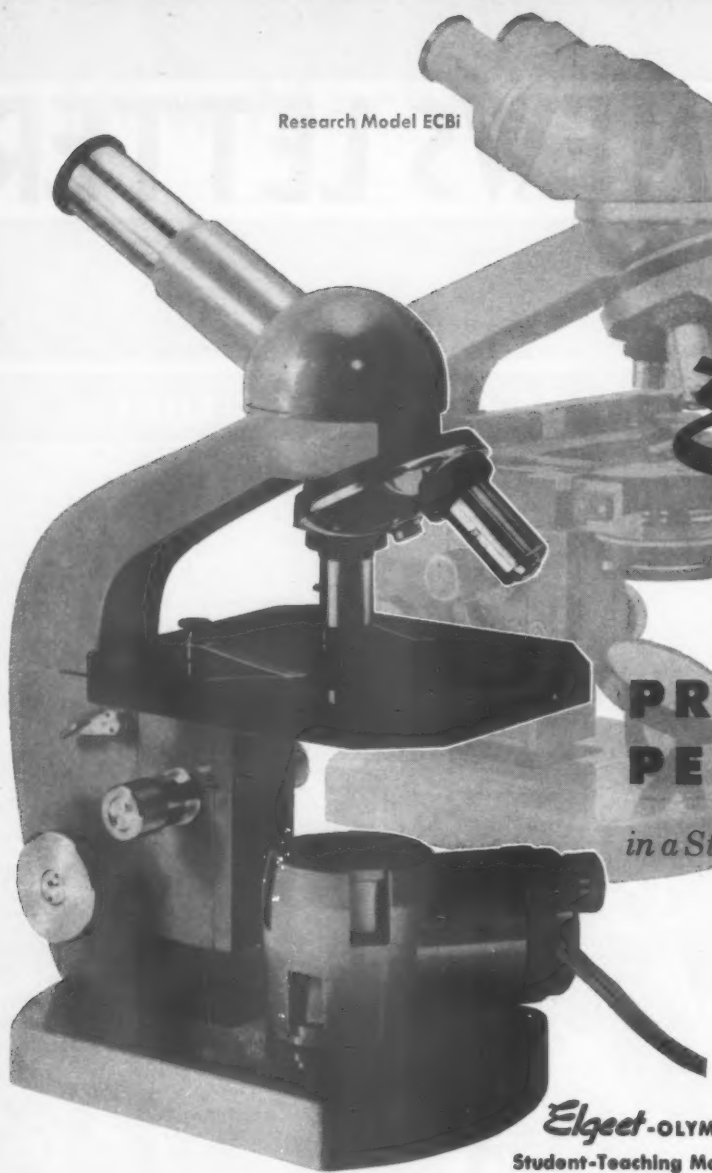
APR 18 1960

MIAMI UNIVERSITY
LIBRARY

MIAMI UNIV LIBRARY
MEDICAL RECORDS
SERIALS ACQUISITION
SERIALS ACQUISITION

A SCIENCE SERVICE PUBLICATION

Research Model ECBi



Elgeet

of Rochester

is *FIRST* to bring you

PROFESSIONAL PERFORMANCE

in a *Student-Teaching Microscope*

for only \$110.50

\$99.45 in lots of five or more

Elgeet-OLYMPUS

Student-Teaching Model S-2

Now, many of the advanced features of famous Elgeet-Olympus Research Microscopes have been incorporated in the new Elgeet-Olympus line of Student-Teaching Microscopes, extending to educators for the first time a number of important instructional advantages.

In addition to its optical and mechanical superiority, you will note the exceptionally solid "heft" of your Elgeet-Olympus Student-Teaching Microscope . . . ruggedly

engineered of "classroom-proof" materials to withstand daily use by untrained hands. Minimum maintenance is further assured by such refinements as completely enclosed rack-and-pinion movements, and a dust-proof, self-centering revolving nosepiece.

Prove to yourself with a 10-day Free Trial that Elgeet-Olympus Student-Teaching Microscopes provide the logical answer to educators who seek the best . . . on a budget.

IMMEDIATE DELIVERY • WRITE Dept.-SM-12

Elgeet

OPTICAL CO., INC. . . . SCIENTIFIC INSTRUMENT AND APPARATUS DIVISION
838 SMITH STREET • ROCHESTER 6, NEW YORK

"Quality is our watchword . . . Precision Engineering our constant goal."

CHEMISTRY

Chemical Warfare Dangers

At the American Chemical Society meeting it was reported that nerve gases would be most lethal in chemical warfare. U. S. scientists have worked on new detection methods.

THE LATEST chemical or biological warfare agents, carried in a single bomber, could kill more people than an H-bomb. At this moment the U.S. population has virtually no means of protecting itself in the initial stages of the attack.

At a meeting of the American Chemical Society in Cleveland, Ohio, Dr. William H. Summerson of the U.S. Army Chemical Corps reported that nerve gases are the most lethal agent that could be used in chemical warfare. These gases kill in minutes by overstimulating the nervous system. Some are so powerful that an aspirin-sized amount of the dried powder can kill 350 animals. There is no detectable odor or color; the victim inhales the gas and dies before anything can be done to save him.

A bomber load of these gases could kill

30% of the people in a 100-square-mile area. The area could be dangerous for as long as 36 hours.

Biological agents (450 pounds) could kill 75% of the people in a 34,000-square-mile area. The residual effects could last up to eight days and once an epidemic was started, it could spread to a much larger area.

Dr. LeRoy D. Fothergill of the U.S. Army Biological Warfare Laboratory, Ft. Detrick, Md., reported that diseases such as typhoid, cholera, anthrax, and rabies could be dispersed by dropping aerosol bombs. The organisms could also be put into water, food and drug supplies, or they could lie dormant in the soil.

Gen. Marshall Stubbs, the Army's Chief Chemical Officer, noted that chemical and biological agents, used together or in com-

bination with nuclear weapons, could wreak untold havoc on an unprepared nation.

Soviet microbiologists, he said, have conducted biological tests in an isolated location over a long period of time. Medical and technical reports indicate that the Russians are well versed in biological warfare.

The officials of DOSAAF, a Soviet program for the military education of civilians, claim that 85% of the population has completed a 10-hour anti-air defense course. The present aim of the organization is to train every citizen in defense against chemical, biological and radiological attack.

The Soviet Union has the physical facilities and the know how to make a successful chemical or biological attack, he stated.

Dr. Alan W. Donaldson of the Public Health Service, Atlanta, Ga., reported that U.S. scientists have been working on new detection methods. The new fluorescein antibody technique is proving fairly successful in identifying many biological agents.

Civilian protective masks have been developed but they are not generally available to the public, said George D. Rich of Washington.

On the other hand, the Russians have gas masks and shelters in many of their public buildings.

Science News Letter, April 16, 1960

Relative Effects of CBR Weapons. Table prepared by the ACS Committee on Civil Defense

Basic Assumption: For the purposes of this table one B-52 bomber (or its equivalent) is considered capable of carrying either one 20-megaton thermonuclear bomb or enough chemical warfare or biological warfare agents to create the comparable results shown in this table.

	Nuclear Agents	Chemical Agents	Biological Agents
Immediate effective area	More than 36 square miles (A & B rings)	100 square miles	34,000 square miles at the very least and with only 450 lbs. of agent
Human lethality (or morbidity) in immediate area (unprotected)	98% (Lethality—A ring)	30% (not necessarily lethal)	25%-75% (morbidity, not necessarily lethal)
Residual effect	Six months fallout with an additional 1,000 square miles of area	3-36 hours (nearly same area)	Up to 8 days or more (possible epidemic spread to other areas)
Time for immediate effect	Seconds	7½ seconds to 30 min.	A few minutes to 14 days
Real property damage, immediate area	Destroyed (nearly 36 sq. miles)	Undamaged	Undamaged
Variation in effect	Little	Wide—need not kill, only incapacitate	Wide—need not kill, only incapacitate
Time an aggressor is able to safely invade area after attack	3-6 months	Immediate	Immediate
Human protection that could be available	Evacuation (?) Shelters Civilian mask (fallout)	Civilian mask, CD-V-805 Shelters with filters	Civilian mask, CD-V-805 Immunization Shelters with filters
Current defense for U.S. population (physical devices)	Some, but can be greatly improved	Nearly nonexistent	Nearly nonexistent
Cost of protection	Shelters (\$150-\$800/person)	Mask—\$2.50-\$8.00 Filters in shelters (\$15-\$20/person)	Mask—\$2.50-\$8.00 Filters in shelters (\$15-\$20/person) Immunization (?)
Covert application	Little	Some	Great
Detection and identification	Simple	Complex but fairly effective and rapid	Difficult, complex, slow
Medical countermeasures	Little	Good if immediate	Some, much more needed. High health and sanitation standards help.
Would attack trigger retaliation?	Yes	Yes	Doubtful if covert, slow at most
Capital equipment costs to produce agents	Very expensive	Somewhat expensive	Relatively inexpensive

MEDICINE

Body Itself Fights Tumors

THE BODY appears capable of producing some resistance to tumors, but the exact manner in which this is done eludes scientists.

There is little doubt that immunological responses to human tumors do occur, Dr. George E. Moore of Roswell Park Institute, Buffalo, N.Y., told science writers attending a seminar in Louisville, Ky., sponsored by the American Cancer Society. See SNL, 77:227, 1960. On the subject of cancer immunity, Dr. Moore said observations of many different cases of cancer support the view that some humans are capable, for as yet unknown reasons, of resisting their own cancer growths. He cited the following examples:

1. There are a few cases where the tumors stopped growing or even disappeared without benefit of treatment.

2. Many patients have survived for a long period despite incomplete removal of their malignancy.

3. Numerous tumors have spread to other parts of the body after the original tumor was successfully treated, but they appeared many years later. Scientists suspect that these newly spread tumors gained their foothold only when some natural defense mechanism broke down.

4. A few tumors that have spread throughout the body will stop growing or be inhibited when the main tumor is successfully removed or otherwise treated. This has led scientists to suspect that with the main tumor growth removed, the body's natural resistance can better attack the smaller tumors.

5. Thousands of tumor cells spill into the blood stream and lymphatic system but each of these cells does not result in another new tumor.

6. Antibodies that attack tumors have been found in a small number of cancer cases.

7. Very few patients have been able to accept a transplant of their own tumor tissue to another place on the body, which should normally be possible unless some unknown is fighting this switch.

Abnormal cells in the human may be produced by a wide variety of chemical and physical agents such as X-rays, abnormal nutrition and possibly viruses, all of which can result in cancer.

Tumors may range from those that are capable of surviving only because their cells are much like their neighboring normal cells to those that are radically different from normal cells. These can grow so rapidly that they are able to survive despite any natural resistance the body can muster against them.

Any vaccine that might be developed in the near future would probably control only the rapidly growing tumors, Dr. Moore predicted.

Cancer "Barometer"

A "SEX HORMONE barometer" that could measure the productivity of the sex glands

and serve as a warning against the development of breast cancer was described at the seminar.

Cancer of the breast, the most common of all human cancers, might some day be controlled if each sex hormone could be identified and its role in the human body determined. Then it might be possible to measure the levels of these hormones and control the amount of each so that the tumors would be deprived of the exact amounts of each needed for their growth.

Steroids, the hormones secreted by the sex glands, are big "promoters" in the development of breast cancer in humans, Dr. Thomas L. Dao of Roswell Park Memorial Institute, Buffalo, reported. All breast cancers need this hormonal environment for growth. This does not mean, however, that hormones are the cause of breast cancer, he cautioned.

His studies with rats revealed they developed breast cancer in a manner similar to humans. For instance, when rats with breast cancer became pregnant, their tumors grew more rapidly because of the abundance of steroids being produced during pregnancy. On the other hand, the breast cancers tend to grow smaller or more infrequently after pregnancy, when steroid production is reduced.

Dr. Dao injected male rats with a substance known to cause tumors, 3-methylcholanthrene. Only one percent of these rats developed mammary cancers. He then transplanted to them the ovaries from their sisters. Breast cancer developed in 60% of these males.

He also discovered that if the cancer-causing substance is injected into rats after they become pregnant, the number of tumors that form is considerably smaller than the number that form when the injected rats are not pregnant. Thus, pregnancy appears to protect the rats from developing breast cancer. Since this is also the case with women, Dr. Dao believes this avenue of investigation may be a fruitful one in the near future.

Link Virus and Leukemia

EVIDENCE that virus is an essential factor in causing human leukemia was presented by a Chicago researcher at the Louisville, Ky., science writers' seminar.

Dr. Steven O. Schwartz of the Hektoen Institute for Medical Research, Cook County Hospital, said a cell-free extract he had taken from the brains of persons who died of leukemia had produced leukemia in mice.

The same material produced an antibody-like reaction in human volunteers in whom this cell-free extract was injected. Blood serum taken later from these volunteers was capable of protecting mice against leukemia from the original agent, Dr. Schwartz said.

The presence of virus in the brain tissue from which the effective extracts came was established by studies with the electron microscope.

Dr. Schwartz emphasized that his research had satisfied all four basic postulates for linking a disease to a causative agent. He listed these as obtaining the agent from human disease, inoculating it into an animal, reproducing the original disease and recovering the disease agent.

One criticism of the work of Dr. Schwartz was offered by a virus expert attending the meeting. He pointed out that Dr. Schwartz might simply have a non-specific reaction. He maintained that the Chicago researcher failed to collect a cell-free extract from the brains of persons who have not died from leukemia. This extract could be injected in other human volunteers.

Science News Letter, April 16, 1960

SCIENCE NEWS LETTER

VOL. 77 APRIL 16, 1960 NO. 16

Edited by WATSON DAVIS

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N. St., N.W., Washington 6, D. C., North 7-2255. Cable Address: SCIENSERV.

Subscription rates: 1 yr., \$5.50; 2 yrs., \$10.00; 3 yrs., \$14.50; ten or more copies in one package to one address, 7½ cents per copy per week; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

Change of address: Three weeks notice is required. When ordering a change please state exactly how magazine is now addressed. Your new address should include postal zone number if you have one.

Copyright © 1960 by Science Service, Inc. Reproduction of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, magazines and other publications are invited to avail themselves of the numerous syndicated services issued by Science Service. Science Service also publishes CHEMISTRY (eight times a year) and THINGS of Science (monthly).

Printed in U.S.A. Second class postage paid at Washington, D. C. Established in mimeograph form March 13, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Reader's Guide to Periodical Literature, Abridged Guide, and the Engineering Index. Member Audit Bureau of Circulation.



SCIENCE SERVICE

The Institution for the Popularization of Science organized 1921 as a non-profit corporation.

Board of Trustees—Nominated by the American Association for the Advancement of Science: William W. Rubey, U. S. Geological Survey; Wallace R. Brode, National Bureau of Standards; Douglas Whitaker, Rockefeller Institute for Medical Research. Nominated by the National Academy of Sciences: Harlow Shapley, Harvard College Observatory; Philip Bard, Johns Hopkins University; Henry Allen Mose, John Simon Guggenheim Memorial Foundation. Nominated by the National Research Council: Leonard Carmichael, Smithsonian Institution; John R. Dunning, Columbia University; Benjamin H. Waller, Johns Hopkins University. Nominated by the Journalistic Profession: Michael J. O'Gden, Providence Journal-Bulletin; O. W. Riegel, Washington and Lee University; Lee Hill, Detroit Free Press. Nominated by the Script Estate: Edward J. Moerman, Memphis Press-Scimitar; Frank Ford, Washington, D. C.; Charles E. Scripps, Cincinnati, Ohio.

Officers—President: Leonard Carmichael; Vice President and Chairman of Executive Committee: Charles E. Scripps; Treasurer: Wallace R. Brode; Secretary: Watson Davis.

Staff—Director: Watson Davis. Writers: Helen Buehl, Ann Ewing, W. T. M. Grigg, Richard Tell, Allen Long, Jane Marye, Tove Nevills, Gloria Telf, Marjorie Van de Water. Science Youth Division: Joseph H. Kraus, Dorothy Schriver, Shirley Moore. Photography: Fremont Davis. Production: Priscilla Hayes, Marcia Neale. Syndicate: Helen Jenkins. Interlingua Division in New York: Alexander Gode, 80 E. 11th St., Gramercy 3-5410. Advertising Manager: Fred A. Moulton, Metropolitan 8-2662.

CHEMISTRY

Fallout Worst for Children

Maximum fallout deposits will occur in 1962-65. Use of chromatography in detecting arson, new source of heavy water and improvements in silicone rubber reported.

CHILDREN now five and six years old will get larger doses than anyone else of the radioactive strontium-90 and cesium-137 already in the air as a result of nuclear weapons tests.

This is because they will be in their period of greatest growth—and consequently greatest uptake of bone- and muscle-building materials—during the time of greatest fallout.

These facts were disclosed at the American Chemical Society meeting in Cleveland, Ohio, by Dr. Wright H. Langham of the Los Alamos Scientific Laboratory. He calculated that the world average strontium-90 bone and bone marrow doses for today's children, as a result of the bomb tests to date, would be ten percent as high as those received from natural background radiation. The cesium-137 bone and bone marrow doses, he said, would be five percent of natural background.

Nuclear weapons tests, not counting the recent French explosions, have produced between 9,000,000 and 10,000,000 curies of strontium-90 and between 16,000,000 and 17,000,000 curies of cesium-137, Dr. Langham said. Of these amounts, about one-third fell to earth close to the test sites, another third has already fallen to earth all over the world, and the other third is still up in the stratosphere, constantly leaking down on earth.

Dr. Langham said the United States and Russia should not have planned the location of their test sites any better if what they actually wanted was to hit the greatest population concentrations of the world with most of the long-range fallout. Because of these locations, long-range strontium-90 and cesium-137 deposits in the area between 20 and 60 degrees north latitude from tests to date are between two and two-and-a-half times the world average.

Maximum deposit in this area will occur in 1962-1965, he said, at which time the strontium-90 level may average about 64 millicuries per square mile and the cesium-137 level about 115. It will be even higher in the U.S.—80 and 140 millicuries per square mile, respectively.

If the same pattern of tests that occurred in the last five years is repeated every five years for the next 40 years, he said, the level of biospheric contamination will reach about eight times what is predicted from weapons tests to date. There it will level off, as the replenishment from new tests will about equal the decay rate of the radioactive particles already in the air.

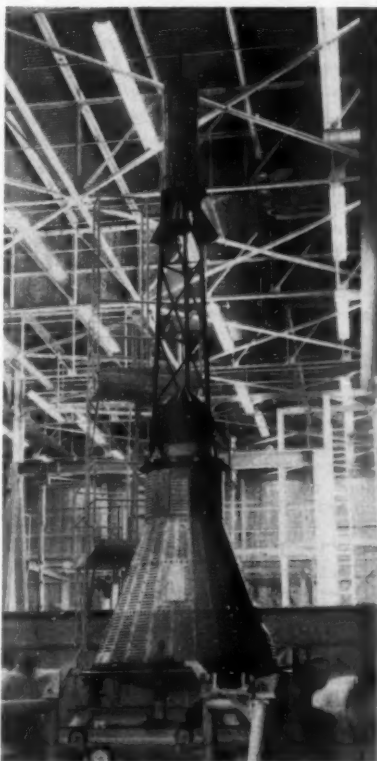
At the same time, three Michigan State University chemists reported that strontium-90 stays right in the leaves and fruits of food plants, while some other fallout products, such as cesium, move into the

stems and roots of plants like lettuce, cabbage, tomatoes and beans.

Drs. H. B. Tukey, S. J. Wittmer and M. J. Bukovac found that more radioactive fallout products are absorbed by the plants through the leaves than from the soil. Most are absorbed by plants near the nuclear explosion within the first 24 hours after the blast. However, succeeding crops of plants all over the world continue to absorb radioactive material from fallout contained in the stratosphere.

Use of Chromatography

GAS CHROMATOGRAPHY now can be used to identify materials suspected of hav-



ESCAPE CAPSULE—Project Mercury space capsule, the first instrumented for escape system tests, has been delivered from McDonnell Aircraft Corporation, St. Louis, Mo., to the National Aeronautics and Space Administration, Wallops Island, Va. The tower on top of the capsule contains the escape system.

ing been used by arsonists to start fires. W. J. Cadman of the Orange County Sheriff's Office, Santa Ana, Calif., and Theron Johns of Beckman Instruments, Pasadena, Calif., reported at the meeting that materials used to accelerate a fire may sometimes be identified after separation by distillation, extraction or other methods.

However, these "accelerators" are often so altered by the loss of their more volatile constituents, the addition of outside impurities, or chemical change in the heat of the fire that these methods are no longer effective.

Gas chromatography, a method of separating gases according to their different rates of flow through narrow tubes, now provides a valuable new weapon in the fight against arson.

Natural to Heavy Water

HEAVY WATER, used as a moderator in some nuclear reactors, may be concentrated in natural water by certain detergents.

E. Griffin Shay of the Atlantic Refining Co., Philadelphia, told at the meeting that these detergents become less soluble in water at higher temperatures, and reach a point on heating at which they become turbid. This point was, he found, at a lower temperature in heavy water (deuterium oxide) than in ordinary water.

By adding special detergents to water containing deuterium oxide, then heating it, a precipitate may be obtained. The upper layer is found to be richer in deuterium oxide than was the original starting solution. Detergents causing this effect are of the non-ionic, ethylene oxide type.

Computer-Made Journal

THE FIRST COPIES of a chemical journal compiled by an electronic computer were received by the 7,000 chemists at the 137th national meeting of the American Chemical Society.

The "electronic editor" that has begun speeding the flow of chemical information to scientists throughout the world is an International Business Machines Corporation computer trained to index thousands of articles from leading chemical journals.

The end-product is a 104-page semi-monthly publication, "Chemical Titles." The computer-made journal makes it possible for the first time to print an indexed bibliography of scientific literature less than three weeks old.

Improve Silicone Rubber

SILICONE RUBBER can be improved by stretching it, then irradiating it with high energy electrons while stretched. M. Prober, G. D. Cooper and F. F. Holub of the General Electric Research Laboratory, Schenectady, N. Y., said samples of peroxide cross-linked silicone rubber treated this way had higher tensile strengths than similar samples that had not been irradiated or had been been irradiated without stretching.

METEOROLOGY

Daily Rockets to Probe Weather in U. S. Net

BEGINNING April 18, weather data from Tiros I satellite will be supplemented by wind data from rockets fired daily from five U.S. bases.

Weather rockets will be fired daily for a month each season from Tonopah, Nev., Eglin Air Force Base, Fla., Cape Canaveral, Fla., Point Mugu, Calif., and Wallops Island, Va.

The Space Science Board of the National Academy of Sciences announced details of the new network. It will be patterned after the present international program of daily balloon observations.

But the new routine of rocket observations will probe more than 200,000 feet into the atmosphere—twice as high as balloons go.

Two solid-propellant rockets will be used. Inexpensive and only a little more than three feet long, Loki will carry a payload of metallic confetti to be ejected at the desired altitude by explosive.

To measure winds, radar will track the chaff as it drifts toward earth.

The other rocket, the eight-foot Arcas, will carry a 12-pound package of instruments to telemeter temperature data to earth. The Arcas nose cone will break from the main rocket and drift on a parachute. Radar will again track the drift.

Both rockets can climb higher than 40 miles.

Data from the new weather network will be distributed to the rest of the world through the international Committee on Space Research (COSPAR). American scientists hope that during COSPAR's quarterly International Rocket Weeks other countries will join the network.

The unprecedented American network will operate for a month each spring, summer, fall and winter.

Feasibility tests of weather rockets were made daily from Fort Greeley, Alaska, and Point Mugu in October, 1959, and Wallops Island and Point Mugu this past January and February.

It was found that high winds may exceed 250 miles an hour and may change rapidly. Meteorologists want to determine how these changes affect weather below.

The new network is a joint undertaking of the Air Force, Army Signal Corps, Atomic Energy Commission, the National Aeronautics and Space Administration, the Navy and the U.S. Weather Bureau.

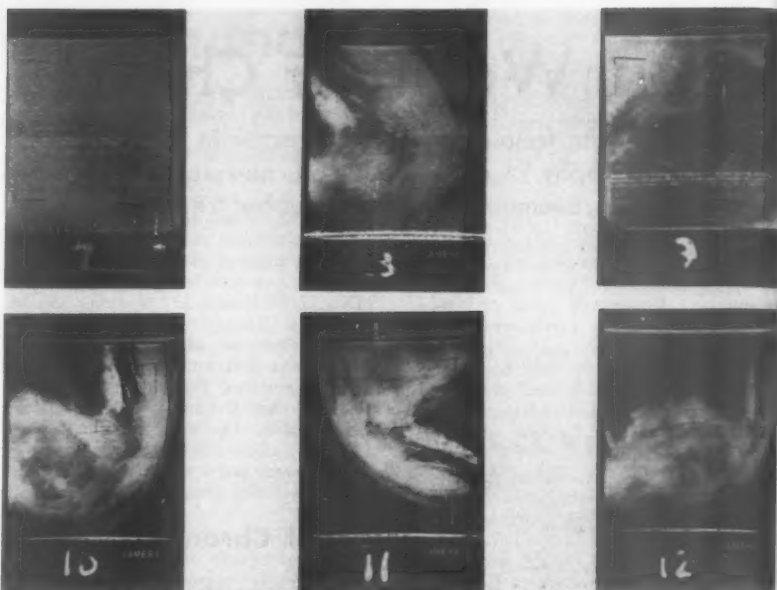
Science News Letter, April 16, 1960

TECHNOLOGY

Greenland Ice Cap Gets Nuclear Reactor

THE UNITED STATES and Denmark plan to install a portable nuclear reactor on the Greenland Ice Cap. A pressurized-water, prefabricated reactor, the first remote-area installation of "portable" atomic power in the free world, is to be installed later at the U.S. Army's Camp Century in Greenland.

Science News Letter, April 16, 1960



CLOUDS OF THE U. S.—These photos were made by the weather satellite Tiros I over the eastern United States and televised back to earth. The cameras were at this time pointed downward and toward the west. The pictures were received by the Army Signal Corps at Fort Monmouth, N. J., for transmission to the National Aeronautics and Space Administration. Pictures 7 and 9 were taken by the Tiros high resolution camera, showing fine detail of the cloud covers. Pictures 8, 10, 11 and 12, were taken with its low resolution camera, showing a larger area with less detail.

ROCKETS AND MISSILES

Tiros Weighs 270 Pounds

See Front Cover

LAUNCHED into orbit April 1, Tiros I is only about a third full. The rest is empty space.

According to an official of the National Aeronautics and Space Administration, the hatbox-shaped satellite could not carry much more instrumentation without becoming too heavy to be lifted into orbit by the 90-foot, 105,000-pound Thor-Able rocket. Tiros I weighs 270 pounds.

Then why did NASA not decrease the size of the satellite shell? Because this would have reduced the area for exposure of solar cells. These convert sunlight into electricity to run Tiros' instruments.

So Tiros is an attempt to strike a balance between weight reduction and energy enough to function.

But it accidentally overdid the weight reduction. A device to measure the heat budget of the earth was not included in Tiros I, as planned, because the device was not ready in time.

Tiros II, scheduled later this year, will include the device (but will still be far from full). The infrared device will measure the heat coming from the earth and the heat coming from space, an official of the U.S. Weather Bureau has said.

This will provide data on the energy budget of the atmosphere—the income, outgo and what is left in the bank. This type of information should be enormously valuable for understanding the atmosphere and the weather.

A smaller infrared device in Tiros I tells only whether it is facing the earth or not. This keeps track of the spinning of the satellite.

But Tiros' manufacturer, the Radio Corporation of America, reports that even without the major infrared device Tiros I is perhaps the most elaborate electronics package yet sent into orbit around the earth.

It contains two miniature TV cameras, video tape recorders, transmitters, solar cells and rechargeable battery power supplies, plus control and communications equipment.

Seen on the cover of this week's SCIENCE NEWS LETTER is Robert Schmicker, of RCA's Astro-Electronic Products Division, Princeton, N. J., putting finishing touches on the interior assembly, mounted on the 42-inch base of the satellite. One of the two TV cameras is in the foreground on a round base. Two magnetic tape recorders for TV pictures are under the transparent domes left and right. See SNL, 77:227, 1960.

Science News Letter, April 16, 1960

PHYSICS

Einstein Principle True

EINSTEIN'S principle of equivalence is true for electromagnetic waves such as radio and light, two physicists at Harvard University have found in very precise experiments.

The equivalence principle is one of the basic assumptions of Einstein's general theory of relativity. It states that no detectable difference exists between the force of gravity and the force produced by acceleration outside a gravitational field.

Earlier experiments have proved the equivalence principle for material bodies, but only recently has the effect of gravity on light, radio waves and gamma rays been detected in the laboratory. If gravity and acceleration are equivalent, Einstein concluded that a gravitational field should lower the frequency of light rays escaping from a gravitational field.

This effect, called the gravitational red shift, had not been conclusively measured until recently. Now, Prof. Robert V. Pound and Glen A. Rebka Jr. have measured the change in frequency of gamma rays as the rays moved up and down through a 70-foot column. They found that gravity raised the frequency of the falling gamma rays and lowered the frequency of the rays rising against the force of gravity.

The Harvard scientists report their results in *Physical Review Letters*, 4:337, 1960. Their measurements of the gravitational red

shift averaged 105% of the value predicted by Einstein, with an experimental uncertainty of 10%.

Another group of physicists at the British Atomic Energy Establishment has also been testing the effect of gravity on electromagnetic waves.

Prior to these studies, scientists were able to study the effect of gravity on electromagnetic waves only by astronomical observations of distant stars. In such observations, precision is low.

The laboratory tests were possible because the nuclei of certain atoms, after decaying from one element into another, give off gamma rays of a sharply defined frequency. Energy of this frequency is absorbed by stable nuclei of the same element as the end-product of the decay.

Prof. Pound and Mr. Rebka started with radioactive cobalt-57 at one end of the helium-filled tower, and iron-57 at the other. They then tested how the absorption of gamma rays by the iron-57 was affected by the upward and downward motion of the cobalt-57.

The overall sensitivity was such that an analogous device for sound would be able to detect the motion of a vehicle moving at about one inch per 3,000 years from the change of pitch of its horn.

Science News Letter, April 16, 1960

GENETICS

Sperm Heads in Man Differ

WHETHER it is a boy or a girl baby may depend upon whether it is a round-headed or long-headed sperm from the father that penetrates the ovum.

Two distinct types of sperm cells in the human male's semen have been seen and photographed. This may mean that sperm cells with round heads give rise to boy babies while sperm cells with elongated heads give rise to girl babies.

Dr. Landrum B. Shettles, assistant professor of clinical obstetrics and gynecology at the Columbia University College of Physicians and Surgeons, adopted a simple and little-used technique to make the discovery. He had been using standard procedures for staining sperm samples until about a month ago when he hit upon the idea of using no stain at all.

By making a thin smear of sperm cells on a glass slide, allowing the slide to dry and examining it under a phase microscope, he could distinguish one type of sperm cell with small, round heads, and another type with larger, more elongated heads. The more popular preparation techniques made all the sperm look alike, Dr. Shettles explained.

The nucleus inside the cell had the same shape as the cell itself—elongate head, elongate nucleus; round head, round

nucleus. In addition, the most centrally situated chromosome in each type of nucleus had the "exact size and shape relationships as the X and Y chromosomes" in the cells from which the sperm developed. From his knowledge of the way sex chromosomes duplicate themselves, Dr. Shettles came to the conclusion that the smaller heads contain the Y (male) factor and the larger heads the X (female) factor.

By studying sperm samples from 30 men, Dr. Shettles found that nuclear size for the two types of sperm remained "remarkably constant" within a given specimen. But the overall size varied to different degrees from one individual to another.

Dr. Shettles, who has been doing research work for more than 20 years, is enthusiastic about the discovery and plans to do statistical studies on his findings. It is generally believed that about 140 boy babies are conceived for every 100 girl babies conceived. If the head shape of the sperm has the significance Dr. Shettles suspects, actual counts will show about 140 round-head sperm for every 100 long-headed sperm. Another study is aimed at showing whether the round-headed sperm can travel faster and penetrate the ovum more easily.

Science News Letter, April 16, 1960



COLUMN OF HELIUM—A 70-foot helium filled column is used at Harvard University to test whether Einstein's principle of equivalence holds for electromagnetic waves. At the foot of the column, Glen A. Rebka Jr. has telephone contact with the top floor where the column ends.

ZOOLOGY

Temperature May Decide Sex of Sea Urchins

A CRAZY, mixed-up bunch of sea urchins may be the result when nature throws cold water on the sex life of the spiny creature of the tide pools.

Dr. Richard Boolootian, zoologist at the University of California, Los Angeles, has evidence that temperature may play an important role in sex determination of the sea urchin.

First of all there is an indication that warm water generally produces more male sea urchins while cold water produces more females. And recently Dr. Boolootian found that in warm water masses subject to wide fluctuations in temperature there was a relatively large number of bisexual sea urchins.

He theorizes that cold shock may be involved in this bisexual pattern of sexuality. Preliminary laboratory experiments tend to bear out this theory of environmental control of sexuality.

Fortunately all this sexual juggling apparently does not work any hardship on the sea urchins. Bisexual sea urchins can fertilize and produce their own eggs.

Science News Letter, April 16, 1960

NUTRITION

Study Shows Many Fat People Like It That Way

MANY FAT PEOPLE are that way because they really do not want to lose weight.

Others overeat to obtain emotional satisfaction, while still others lack the intelligence to understand the aims of a diet program.

These are the conclusions of two Philadelphia physicians, Drs. Donald Berkowitz and Nathaniel Berk, reported in the *Journal of the American Medical Association*, 172:1381, 1960. They studied 100 patients referred to the obesity clinic of the Sidney Hillman Medical Center, Philadelphia. All were at least 20% overweight and their weight varied from 151 pounds to 320 pounds.

The 93 women and seven men received treatment that consisted of education, reduction of food, an appetite suppressant drug called *Levonor*, supplied by the Nordson Pharmaceutical Laboratories, Irvington, N. J., exercise and psychotherapy. Thirty-eight of the 100 did not even finish the course, virtually all gained weight after stopping treatment, and 19 gained beyond their original weight.

Of the remaining number, 42 lost 20 pounds or more, and one woman lost 70 pounds. She originally weighed 320. Twenty lost less than 20 pounds and six were discharged after having reduced to normal weight. Fifty-six were still under treatment at the end of the year.

The educational effort consisted of "brainwashing" the patients of nutritional fancies. The doctors decided that 20% just could not grasp the lesson. All patients were given the appetite suppressant three times daily before meals. Again, 20% failed because the emotional need to eat did not depend on appetite. Half of the 58 failures, which included those who withdrew plus those who lost less than 20 pounds, lacked motivation, the doctors decided.

Science News Letter, April 16, 1960

PSYCHOLOGY

Most Murders Done By Persons Who Are Sane

MOST MURDERS are committed by persons who are not mentally ill, but who have an abnormal or infantile disregard for human life. This is the conclusion of Dr. Manfred S. Guttmacher in a new book, *The Mind of the Murderer* (Farrar, Straus and Cudahy). (See p. 254)

Dr. Guttmacher teaches psychiatry at Johns Hopkins University and the University of Maryland, is in private practice of psychiatry and for 25 years has been Chief Medical Officer to the Supreme Bench of Baltimore.

Of 175 cases studied by Dr. Guttmacher, 53 of the murderers were mentally ill, 105 were clearly not psychotic and 17 were seriously abnormal but a psychosis at the time of the crime could not be definitely established.

A number of clear differences between the insane murderer and those who were not psychotic are cited by Dr. Guttmacher.

Nearly every murder committed by an insane individual is preceded by some sign of insanity. A third of Dr. Guttmacher's group had had previous institutionalization for mental illness.

Victims of the insane killer are generally intimate associates, frequently his own children. Most insane killers show no remorse and freely confess. The motives they give seem completely inadequate to a sane person.

The crimes of an insane killer are generally extremely bloody and are not well planned; he often kills with whatever object he can pick up and in full view of onlookers. Only one-fifth of the mentally ill murderers had a record of previous convictions for assault or serious criminal offense while two-fifths of the non-psychotic group had such convictions.

More than a third of the mentally ill murderers had no memory of the crime or had only partial memory. This was rare among the non-psychotic unless the perpetrator was dead drunk at the time.

Science News Letter, April 16, 1960

MEDICINE

Tiredness May Mean Physical Illness

IF A PATIENT'S main complaint is tiredness, he is probably physically ill, rather than just worn out.

Dr. Geoffrey Ffrench of Oakville, Ontario, Canada, studied 1,200 patients, 105 of whom listed tiredness as the first or second most important reason for reporting to the doctor. Physical examinations revealed that 25% of the tired patients were anxious or tense, but had no actual physical illness.

The other 75% had diseases and dysfunctions ranging from alcoholic gastritis to leukemia and pneumonia. A person with thyroid deficiency was most likely to report tiredness, and anemia patients came second. Heart disease, lung cancer and infectious mononucleosis also frequently resulted in complaints of fatigue.

Dr. Ffrench also noted that in cases of endocrine dysfunction, such as diabetes mellitus, the patient could be tired when the gland was functioning too little or too much.

Details of the research are reported in the *Canadian Medical Association Journal*, 82:665, 1960.

Science News Letter, April 16, 1960

ANTHROPOLOGY

Relocated Indians Become Self-Supporting

SEVEN out of ten Indians who have left their reservations and settled in western and Midwestern cities have become self-supporting, it is reported by the Bureau of Indian Affairs. Since 1952, 31,259 Indians have been relocated. Progress is also reported in a program of vocational training for adult Indians. During the two-year period, 1958-59, 2,017 Indians have been enrolled.

Science News Letter, April 16, 1960

IN SCIENCE

MEDICINE

Treatment May Result From Heart Muscle Study

A NEW LINE of treatment for heart attack patients could come from studies of heart muscle cells and the food elements that make these cells grow.

Dr. James W. Green, associate professor of physiology and biochemistry at Rutgers Bureau of Biological Research, New Brunswick, N. J., is working to determine the nutritional requirements of heart muscle cells as distinct from the nutritional requirements of the whole heart.

Acute damage to heart tissue (such as after a heart attack) is followed by replacement with scar tissue, Dr. Green explained. If some way could be found to supply a nutritional environment that promotes the growth of heart muscle in such cases, the scar tissue would be less readily formed, he said, and the heart would be more functional when healed.

At the moment Dr. Green is concerned with growing heart muscle cells in test tubes and culture plates. He needs large quantities of cells that grow for periods of time long enough to permit biochemical analysis.

The problem of separating the heart muscle cells from the surrounding connective tissue (which makes up scar tissue) has been solved. This was accomplished by using seven- to eight-day-old chick embryo hearts and trypsin, a digestive enzyme that causes the actual separation of the two kinds of cells. Dr. Green has adapted the separation technique for use on the hearts of newborn mice.

The next step will be an attempt to grow the heart muscle cells in whole suspension cultures for large scale use in analysis.

Science News Letter, April 16, 1960

MEDICINE

Swiss Tranquilizer Cuts Epileptic Seizures

A SWISS-MADE drug appears to be twice as effective in preventing epileptic seizures as other, currently used anticonvulsants, a team of doctors reported in Coral Gables, Fla.

The drug, Librium, has been tested for six months by Dr. Samuel Kaim of the department of psychiatry, Dade County Veterans Administration Hospital in Coral Gables, and Dr. Ira Rosenstein.

They discovered its effect as an anticonvulsant while using it as a general tranquilizer. Epileptic patients showed a marked reduction in epileptic seizures. Since that discovery, the drug has been given to 24 epileptic patients; 23 have responded to the treatment and one has shown no change.

Science News Letter, April 16, 1960

WET FIELDS

AGRICULTURE

Herbicide Shows Low Animal Toxicity

A NEW HERBICIDE has been reported that is especially effective in killing young plants yet has a low acute toxicity for warm-blooded animals.

It is active against many weeds, such as wild oat, bracken, chickweed and cleavers. Seeds of some plants, however, such as rice, groundnuts, corn and sunflower, show a distinct resistance to it.

The substance is 2,6-dichlorobenzonitrile and is known by the code name H 133. Experiments involving its use were described in *Nature*, 186:89, 1960, by H. Koopman and J. Daams of N.V. Philips-Duphar, Holland.

H 133 was found to be especially effective in inhibiting germination of seeds. It is easily absorbed by seeds either from a solution or from the vapor.

Young growing tips were found to be very sensitive to the compound, which acts via the roots as well as by way of the green parts of the plants. Older and full grown plants were not damaged.

Experiments in which respiration or photosynthesis was measured showed that neither of these processes in tobacco leaves was inhibited if the leaves were placed in a saturated solution of H 133.

Science News Letter, April 16, 1960

ARCHAEOLOGY

Salvage Work May Bring Prestige, Temples to U.S.

THE UNITED STATES may gain prestige in the eyes of the world, as well as a few ancient temples and other art treasures, if she helps save them.

George C. Denney Jr., of the Senate Foreign Relations Committee, reported that an amendment to the foreign aid bill, proposed by Sen. A. S. Mike Monroney (D-Okla.), would allot funds to save the Egyptian treasures. The money would come from Egyptian currency amounting to about \$100,000,000 that have piled up in that country from the sale of U.S. surplus farm products. It is estimated that only about half of that amount will be used for the rescue work.

Dr. John A. Wilson, chief archaeologist at the University of Chicago, testified before the Senate Foreign Relations Committee that it would be to our advantage to support the efforts to save ancient treasures located in the Nile valley that will become a 300-mile long lake when the new high Aswan dam is built.

Dr. Wilson, who is also the head of the National Committee for the Rescue of the Monuments of Nubia, said the salvage operation, invited by both Egypt and Sudan

as well as UNESCO, will offer us a chance for international cooperation. He sees as a result of our participation that new objects of art and new archaeological material will benefit American museums (Egypt and Sudan have promised the countries that help in the rescue action half of the treasures they salvage).

He quoted American interest in Egyptology which has always been high. He said that the American collections of ancient Egyptian treasures are the greatest in the world next to those of Egypt herself. He also predicted that America may be able to transport and rebuild one or more of the salvaged temples in this country.

He added that our interest and help would arouse the admiration of the scholarly world and boost our reputation abroad in this endeavor of high historical importance.

Science News Letter, April 16, 1960

ENGINEERING

750,000 Volts to Test Experimental Power Line

AN EXPERIMENTAL extra-high-voltage transmission line to operate at 750,000 volts is to be built along the Ohio River near Apple Grove, W. Va., this year.

Planned to be only six towers long, the line will be a joint project of the American Electric Power Service Corporation, New York, and the Westinghouse Electric Corporation. It will be used by engineers to explore the technical and economic aspects of transmitting large blocks of electric power for long distances by using extremely high voltages.

Such lines some day may let electric utilities generate power right at the fuel source where the fuel price is low. The lines thus would be used to get the power from, say, the coal field to the big city where it is needed.

The new line will be made of three sections so three kinds of conductors can be tested at once. Measurements will be made on such factors as humidity, atmospheric pressure and temperature.

Contributing to the project also will be Kaiser Aluminum & Chemical Corporation, The Lapp Insulator Company, Inc., Ohio Brass Company, The Thomas & Betts Company and American Bridge Division of U.S. Steel Corporation.

Science News Letter, April 16, 1960

TECHNOLOGY

Economical TV Projector Eliminates Scratches

A CONTINUOUS television film projection system will enable local stations across the country "to combine the economy of 16-mm projection with 35-mm quality." Designed by Eastman Kodak Company for the General Electric Company, the projector incorporates a new diffused light system.

It is said to practically eliminate the effects of scratches and dirt particles on 16-mm films and to project a steadier image on the screen.

Science News Letter, April 16, 1960

AERONAUTICS

Radar System Maps Enemy Lines, Soldiers

A REVOLUTIONARY low-distortion, airborne radar system that can keep an eye on enemy troops in almost any kind of weather has been developed.

The radar can produce aerial maps of thousands of square miles of land per hour, night or day. The system gives U.S. field commanders near-photographic, up-to-the-minute information on troops and material movements well behind enemy front lines, and pinpoints targets scattered over wide areas.

Designed to operate at altitudes of 1,000 to 5,000 feet, the radar can see through camouflage, rain and fog. It also distinguishes between stationary and moving objects and can identify field ice, icebergs and fishing vessels that drift with the current.

In aerial photographs, objects at the edge of the picture appear to be smaller because they are farther away from the camera. The side-looking radar has a mechanism for correcting this distortion and everything in the viewing field is reproduced on the same scale.

The system, designed for the Air Force by Texas Instruments Incorporated in Dallas, Tex., can map from either piloted or unmanned aircraft at ground speeds of 200 to 900 miles an hour. It simultaneously records strips of terrain, either three or six miles wide, on both sides of the aircraft and relays the information back to a ground receiver station.

One modification of the system will allow mapping at ground speeds up to 2,500 miles an hour, and a second modification will map 10- or 20-mile widths.

It has already been used in the North Atlantic to identify icebergs, growlers, and field ice in fog.

Science News Letter, April 16, 1960

CHEMISTRY

Graphite Rolls Up Like Window Shade

THE LUBRICATING properties of graphite are due to microscopic layers, inside the graphite crystal, that roll up like window shades and act like roller bearings, recent research indicates. This modifies the older explanation—that the graphite layers slide over each other like a slippery deck of cards.

Dr. W. Bollmann and J. Spreadborough of the Battelle Memorial Institute, Geneva, Switzerland, found the tiny rolls by using an electron microscope which magnified graphite samples 24,000 times.

The lubricating quality of graphite changes with varying conditions of temperature, pressure and humidity. These changes are more easily explained by the roll-up theory than by the slide theory, the investigators reported in *Nature*, 186:29, 1960. If the layers actually slid over each other, they could become "locked" together by foreign atoms. If this ever happened, graphite would be no good as a lubricant.

Science News Letter, April 16, 1960

CONSERVATION

Species Fight for Survival

Man's carelessness has placed many species of North American wildlife on the verge of extinction. He has the power to save them if he will accept the challenge.

By RICHARD LITELL

SOME 50 SPECIES of North American wildlife are in danger of being as unknown to future generations of Americans as the dinosaur and mastodon are to people of today.

This does not mean that they are definitely doomed to extinction. What it does mean, however, is that their numbers have been reduced to such a degree as to cause serious concern over their chances of survival.

Perhaps the most publicized species threatened with extinction is the whooping crane. These magnificent birds, nearly as tall as a man and with a wingspread of almost seven feet, possibly may not have exceeded 1,400 at the time America was discovered.

By 1938, only 14 remained because they could not cope with the draining of the prairie potholes, plowing under of the grasslands and excessive shooting along their migration routes.

The total population of whooping cranes now numbers 38, including six held in zoos. The comeback is largely due to public concern for their existence, which led to creation of the Aransas National Wildlife Refuge in Texas on their hereditary wintering grounds.

Other birds whose numbers are dangerously low are the Everglade kite, California condor and the nene. The once-common California condor, our largest soaring land bird, ranged from lower California to the Columbia River. Today not more than 60 birds remain. The nene, or Hawaiian goose, probably numbers not more than 50 wild birds now.

Other Species Threatened

Nor are bird species the only ones threatened with extinction. Many mammals, fish and reptiles are also in danger.

The most well known of the mammals, perhaps, is the grizzly bear. There appear to be fewer than 800 grizzlies still remaining in the United States (excluding Alaska), about one-fourth of which are found within the boundaries of our national parks.

Other endangered mammals include the sea otter, tule elk, black-footed ferret, kit fox, manatee (sea cow), Key deer and Caribbean monk seal.

Two North American reptiles are also in peril—the green turtle and the American crocodile. Among rapidly disappearing fish species are the lake sturgeon, grayling. Great Lakes whitefish and lake trout.

With some notable exceptions, however, few of today's endangered species are con-

sidered to have already gone the way of the heath hen, Carolina parakeet, great auk, Labrador duck, sea mink, passenger pigeon and Merriam elk, all of which became extinct during the past century.

The passenger pigeon, a particularly tasty game bird, is an especially sad case. The most numerous bird in the country around 1800, it has not been seen since 1914. Passenger pigeons were particularly easy to kill because they congregated in huge flocks.

Two birds believed extinct, but not yet generally referred to as such, are the Eskimo curlew and the ivory-billed woodpecker. The latter, North America's largest woodpecker, has not been reported seen since 1952.

Fortunately, several species are apparently making decided comebacks. The trumpeter swan, the world's largest waterfowl, and the wood duck are two of these.

At the turn of the century, many believed

the trumpeter to be already extinct in this country. Records of the Hudson's Bay Fur Company show that more than 17,000 swan skins were sold between 1853 and 1877, the bulk of which were supposed to have been those of the trumpeter.

But by 1958, the trumpeter's number had increased to more than 700. Its recovery is a fine example of conservation in action—complete protection from shooting and from intrusion of men and cattle on its nesting areas.

"Old Baldy" Vanishing

The bird of the nation's national emblem, the bald eagle, once ranged over most of North America. Now the species, estimated at a total population of about 1,000, is concentrated in Florida and Alaska, the extremes of its original homeland.

Though often protected by Federal law, "Old Baldy's" size makes it an enticing target. Too often young eagles have been mistaken for hawks and shot.

A million Attwater's prairie chickens are thought to have ranged over the coastal prairies of Louisiana and Texas at one



DESERT MOUNTAIN SHEEP—This young ram was photographed in the Kofa Game Range, Yuma, Ariz., as he approached a water hole. He climbed the rock in order to locate the camera. Among the most sure-footed of animals, these sheep are diminishing in number.

time. Today, as a result of pollution from oil drilling, rice farming that destroys their grasslands, and drought, only a few thousand remain.

Other feathered species that must be considered on the endangered list are the Mississippi kite, swallow-tail kite, white-tailed kite, Hudsonian godwit, Florida sandhill crane, Laysan teal, Aleutian tern, Florida burrowing owl, peregrine falcon, red-bellied hawk, Kirtland's warbler, and Cape Sable seaside sparrow.

In addition, there are the limpkin, flamingo, woodcock, reddish egret, American egret, snowy egret, roseate spoonbill, and great white heron. The great white heron is the largest and rarest of the herons. Its present population, confined almost entirely to Florida Bay and Florida Keys, numbers about 2,000.

To the endangered mammals already mentioned must be added the Sierra bighorn sheep, desert mountain sheep, woodland caribou, gray wolf, red wolf, walrus, wolverine, and coyote.

All these endangered animal species are victims of man's mismanagement of his natural resources and his greedy preoccupation with his own species. Conservationists are certain that all but the rarest of these animals can be saved by proper measures backed up by public support.

The National Wildlife Federation, a private association of state federations or leagues and their affiliated local conservation clubs, offers these eight courses of action to help save endangered wild life:

1. Promotion of coordinated research to determine best restoration methods.

2. Encouragement of Federal and state programs aimed at protection and restoration.

3. Halting of wanton and accidental slaughter of remnant populations of endangered species as well as destruction of habitats.

4. Establishment of comprehensive use policies at all government levels that will ensure protection of wildlife habitat in connection with development of agricultural, mineralogical and industrial resources.

5. Initiation of educational campaigns to create public awareness of the plight of endangered wildlife.

6. Defense from encroachment of established state, Federal and private sanctuaries, refuges, parks, forests and wilderness areas maintained for the benefit of endangered species.

7. Effective pollution control for streams, lakes, marshes and coastal waters.

8. Support for the Survival Service of the International Union for the Protection of Nature, Brussels, Belgium, which attempts to protect endangered species throughout the world.

The U. S. Fish and Wildlife Service maintains that the future of American wildlife is in the hands of the American people.

"Constant vigilance and concerted action by all conservationists and conservation organizations are necessary if we are to succeed in saving and restoring our endangered species of wildlife."

Science News Letter, April 16, 1960

ALCOHOL BURNER

Heavy glass alcohol lamp. 1 oz. capacity with metal screw-on cap and cotton wick. Gets heat to the spot you want it. Leaves no carbon smudge. Worth several times price we ask.

Each 25¢ plus 10¢ pp.

6 for \$1.25 plus 25¢ pp.

12 for \$2.40 plus 50¢ pp.

HARRY ROSS Scientific & Lab Apparatus

63 Reade St., N. Y. 7, N. Y.



Study live insects and whole specimens!



with TESTA WIDE FIELD MICROSCOPE

Rugged, full-size American-made microscope features large working distance and 15x, 45x, and 75x magnification. Unusual versatility. Arm can be inclined in any direction of a 360° circle. Tube removable for field trips.

Kellner-type eyepiece. Triple divisible objective. Dual control coarse and fine focusing. Large reversible black and white stage. **\$54.85**

Write for full details!

TESTA MANUFACTURING CO.

Dept. SN-4 • 10126 East Rush St., El Monte, Calif.

GEM TESTING

B. W. Anderson

New edition • Greatly expanded • Completely revised and up-to-date • A mine of practical gem information.



Partial Contents: How to use this book. Refractive index and measurement. Double refraction and how to detect it. Colour, colour filters, and the dichroscope. The specific gravity of gemstones and how to measure it. Detection of synthetic and imitation stones. The use of the microscope. The use of the spectroscope. The identification of ruby. The identification of sapphire. Identification of emerald. Aquamarine and alexandrite. Identification of zircon. Identification of topaz. Identification of pink, mauve, or lilac stones. Identification of brown and orange stones. Quartz, opal, and the garnets. Tourmaline, peridot and spinel. Jade and jade-like minerals. Turquoise and lapis lazuli. Cat's-eyes, starstones, and others. Amber, tortoiseshell, coral, and jet. Pearls: real, cultured, and imitation. Fluorescence as an aid to identification. Appendix. Names and addresses of recommended suppliers.

Large hardbound book, handsome cloth binding. Profusely illustrated; Indexed. Try it 10 days at our risk!

\$11.50 Postfree

ORDER NOW!

EMERSON BOOKS, Inc., Dept. 954-L

251 West 19 Street, New York 11

Used and Approved by Leading Universities!

Now you can enjoy the same superior performance at the low DYNASCOPE price!

4-Inch Dynascope



Only **\$59.95**

F.O.B. Hartford Shipping Wt. 16 lbs.

Express charges collect

Same model with new Dyn-O-Matic

Electric Drive only \$79.95

F.O.B. Hartford

Comes complete with sturdy steel tripod that sets up instantly on uneven terrain. Folds up for carrying.

America's most popular 4-inch reflector! Includes such professional features: 4-inch parabolic pyrex mirror, aluminized and quartz coated • Quick-action equatorial and altazimuth mount with fingertip control • Setting circle • 4-power crosshair finderscope • Rack & Pinion focusing • 3 compound eyepieces (65X, 130X, 167X). • Lifetime 45" bakelite tube.

Model RV-6

6-Inch Dynascope



ONLY **\$194.95**

F.O.B. Hartford Shipping Wt. 50 lbs. Express charges collect

New Dyn-O-Matic Electric Drive assures effortless, automatic tracking. Use any A.C. household socket.

Finest American-made 6-inch reflector in its price range! Save \$100 or more, yet get all these fine features: f/8 6-inch mirror accurate to 1/8 wave • electric drive • 3 matched eyepieces (75X, 150X, 343X) • 6x30 Achromatic finderscope • Heavy-duty mount with setting circles • Rack & Pinion eyepiece holder • Rotating tube • Sturdy lightweight tripod.

FREE FACTS

on new 6", 8", 10", 12", 16" Custom DYNASCOPES
Mail coupon today!

Criterion Manufacturing Company

Dept. NL-56, 331 Church St., Hartford 1, Conn.

☐ Under your money-back guarantee, please ship me promptly the DYNASCOPE checked below. My payment in full enclosed.

☐ 4-inch \$59.95 ☐ 6-inch \$194.95

☐ 4-inch with Electric Drive \$79.95

☐ Send FREE LITERATURE on Custom DYNASCOPES and details of your Easy Payment Plan.

Name _____

Address _____

City _____ State _____

Books of the Week

For the editorial information of our readers, books received for review are listed. For convenience purchase of any U. S. book in print, priced at 95¢ or over, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

ADVENTURING WITH BEEBE: Selections from the Writings of William Beebe—*Viking*, 282 p., photographs, paper, \$1.25. Tales by a world-renowned naturalist.

AIR ALL AROUND—Tillie S. Pine and Joseph Levine—*Whittlesey House*, 48 p., illus. by Bernice Myers, \$2.50. Simple science facts and experiments for youngest readers.

ANALYSTS POCKET BOOK—J. R. Majer—*Butterworths (Canada)*, 100 p., \$3.50. Quantitative information in compact form.

ASTM STANDARDS ON METALLIC-COATED IRON AND STEEL PRODUCTS: Zinc-Coated Sheets, Hardware, Wire, Strands, Fencing, and Pipe Aluminum-Coated Products, Terence-Alloy-Coated Sheets—ASTM Committee A-5—*Am. Soc. for Testing Materials*, 164 p., illus., \$3.50.

ASTM STANDARDS ON METHODS OF ATMOSPHERIC SAMPLING AND ANALYSIS: Methods of Testing, Recommended Practices, Definitions—ASTM Committee D-22—*Am. Soc. for Testing Materials*, 102 p., illus., \$2.25.

BECOMING: Basic Considerations for a Psychology of Personality—Gordon W. Allport—*Yale Univ. Press*, 106 p., paper, 95¢. Reprint of 1955 edition.

THE BEGINNER'S BOOK OF POTTERY, Part 1: Coil and Slab Pottery, Part 2: Throwing, Casting, Decorating and Firing—Harold Powell—*Emerson*, 64 p. each, illus., \$2.50 each. Amply

illustrated, teaches youngsters an art known to man since prehistoric days.

BIBLIOGRAPHY OF THE DOG—Marcus M. Mason—*Iowa State Univ. Press*, 405 p., \$6. 12,369 references on naturally occurring diseases of the dog, and advanced physiologic and pathologic studies.

BIOLOGY—Elsbeth Kroeber, Walter H. Wolff and Richard L. Weaver—*Heath*, rev. ed., 646 p., illus., \$5.32. High school text with emphasis on out-of-doors biology.

BIOLOGY OF THE PLEURO-PNEUMONIAL-LIKE ORGANISMS—John B. Nelson, Ed.—*N.Y. Acad. of Sciences, Annals*, Vol. 79, Art. 10, 453 p., illus., paper, \$5. Explains the pathogenic importance of the organism of contagious bovine pleuropneumonia in certain parts of the world.

THE BOYS' BOOK OF HOW THINGS ARE MADE—Leslie Hunter—*Roy Pubs.*, 144 p., illus., \$3. The story of modern technological advances in power, metals, textiles and plastics, abundantly illustrated.

CALCULUS AND ANALYTIC GEOMETRY—George B. Thomas, Jr.—*Addison-Wesley*, 3rd ed., 1010 p., \$9.75. For students of science and engineering, text suitable for courses up to three semesters.

CAREERS AND OPPORTUNITIES IN PSYCHOLOGY—Juvenal L. Angel—*World Trade*, 26 p., paper, \$1.25. Describes nature of work, specializations, training, remuneration and help in financing graduate training.

CHILDREN OF THEIR FATHERS: Growing up among the Ngoni of Nyasaland—Margaret Read—*Yale Univ. Press*, 176 p., photographs, \$4.75. Anthropologist's observations of children growing up in a Ngoni village, from birth to maturity.

DARWIN OF THE BEAGLE—Bern Dibner—*Burns Lib.*, 73 p., illus., \$3.50; paper, \$2.50. Story of Darwin's journey, stressing his formative years and the detailed observations of the young scientist.

DIRECT CURRENT ELECTRICITY: Franklinian Approach—Alexander Efron—*Rider*, 91 p., illus., paper, \$2.25. Electro-chemistry, electrical measuring instruments, electricity and heat, and induced electromotive force.

ELECTRONIC COMPUTERS: Principles and Applications—T. E. Ivall—*Philosophical Lib.*, 2nd ed., 263 p., illus., \$15. New chapters deal with analogue computer circuits, programming of digital computers, and evolution of "intelligent" machines.

ELEMENTARY SCIENCE

is coming of age
Now a single science specialty house can supply ALL of your school science equipment and supply needs from Anthropology to Zoology. Most complete catalog in the field FREE to teachers, 25¢ to others.

WORLD OF ADVENTURE
2543 15th St., Denver 11, Colo.

BOX and COVER — Lucite

Clear lucite 2" x 2" box $\frac{3}{4}$ " thick, radius of 1" on side. Box and lid hold together tightly. Items are visible while stored. Holds screws, seeds, gems, pins, stones, etc. New stock, beautifully made, costs twice our sales price to manufacture. Only 50¢ per dozen Postpaid. 1000 for \$21.00 Postpaid.

HARRY ROSS Scientific & Lab Apparatus
63 Reade St., N. Y. 7, N. Y.

ENGLISH FOR THE ACADEMICALLY TALENTED STUDENT IN THE SECONDARY SCHOOL—Ardo Jewett, Ed.—*Nat. Educ.*, 128 p., paper, \$1. Committee report of the National Council of Teachers of English.

EXCAVATIONS IN THE UPPER LITTLE COLORADO DRAINAGE, EASTERN ARIZONA—Paul S. Martin and John B. Rinaldo—*Chicago Nat. Hist. Mus.*, 127 p., illus., paper, \$4. Report on the archaeology of the beach sites, and the artifacts and pottery found.

FOUNDATIONS OF THE ELECTROMAGNETIC THEORY—John R. Reitz and Frederick J. Millford—*Addison-Wesley*, 387 p., \$8.75. Textbook for courses in electricity and magnetism, on the advanced undergraduate level.

FREUD AND DEWEY ON THE NATURE OF MAN—Morton Levitt—*Philosophical Lib.*, 180 p., \$3.75. Comparison of the basic contributions of psychoanalysis and progressive education.

FUNDAMENTALS OF CHILD PSYCHIATRY—Stuart M. Finch—*Norton*, 334 p., \$5.95. For medical students, students in psychology, and related fields.

FUNDAMENTALS OF MATHEMATICS—Elbridge P. Vance—*Addison-Wesley*, 469 p., \$7.50. Presents unified treatment of the basic ideas of algebra, trigonometry, and analytic geometry, with substantial introduction to calculus.

GLAUCOMA: Transactions of Fourth Conference, March, 1959—Frank W. Newell, Ed.—*Macy*, 257 p., illus., \$8. Multiprofessional conference discussions, bibliographies included.

THE GOLDEN GARDEN GUIDE: A Practical Handbook of Gardening and Outdoor Living—John Strohm, Ed., with Ford Motor Co.—*Golden Press*, 176 p., illus. paper, \$1. Full of useful, clearly presented gardening hints for every season and region in the United States.

HENRY E. SIGERIST ON THE HISTORY OF MEDICINE—Felix Marti-Ibanez, Ed., foreword by John F. Fulton—*MD Publications*, 313 p., \$6.75. Essays and lectures by a great medical historian who was also a crusader for humanism.

HENRY E. SIGERIST ON THE SOCIOLOGY OF MEDICINE—Milton I. Roemer, foreword by James M. Mackintosh—*MD Publications*, 397 p., \$6.75. Anthology of medico-sociological articles by one of the foremost proponents of the social science aspects of medicine.

THE HORSE THROUGH THE AGES—Cecil G. Trew—*Roy Pubs.*, 75 p., illus. by author, \$2.95. Beautifully illustrated story of the development of the horse since Pleistocene days, for young people.

THE HOW AND WHY BOOK OF DINOSAURS—Darlene Geis, Paul E. Blackwood, Ed.—*Grosset*, 48 p., illus. by K. Shannon, \$1. Designed to stimulate young readers' curiosity about the extinct reptiles of long ago.

THE HOW AND WHY BOOK OF ROCKS AND MINERALS—Nelson W. Hyler, Paul E. Blackwood, Ed.—*Grosset*, 48 p., illus. by K. Shannon, \$1. Answers science-minded young readers' questions about the earth's surface.

THE HOW AND WHY BOOK OF STARS—Norman Hoss, Paul E. Blackwood, Ed.—*Grosset*, 48 p., illus. by James Ponter, \$1. Answers children's questions about the universe.

HUMAN DEVELOPMENT—Phyllis C. Martin and Elizabeth Lee Vincent—*Ronald*, 541 p., illus. by W. A. Osburn, \$6.50. Introduction to
(Continued on p. 254)

HEAR GERMAN POETRY!

Lotte Lenya, famed star of European and American stage, reads great poetry of Goethe, Rilke, Heine, Schiller, 30 others, from Minneapolis to present. "Invitation to German Poetry", 50-minute (12", 33 $\frac{1}{2}$ ") hi-fi recording. 165-page illustrated book, full record text, English translation, \$4.95. Money-back guarantee. Dept. ENL, DOVER, 180 Varick St., N. Y. 14, N. Y.

*They cut through
error and
opposition with*

THE EDGE OF OBJECTIVITY

AN ESSAY IN THE HISTORY
OF SCIENTIFIC IDEAS

*By Charles Coulston
Gillispie*

This is the challenging and sympathetic story of those men—Galileo, Newton, Lavoisier, Darwin, Maxwell, Einstein and others—who dared to challenge 'established fact' and comfortable popular opinions in order to advance scientific knowledge. It is also the sometimes sad story of men who tried and failed, and of others—like Goethe—who did not want to pay the penalty of alienation that objectivity implies.

\$7.50 at your bookstore



**Princeton
University Press**
Princeton, N. J.

Payoff in portable photons

Samarium-145, Samarium-153, Gadolinium-153.

Scientists at the General Motors Research Laboratories began three years ago to measure and re-evaluate the nuclear characteristics of these rare earth isotopes — their half-lives, photon emissions, thermal neutron cross sections.

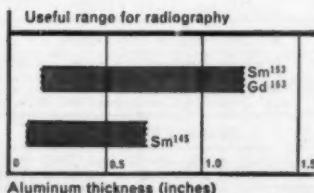
Conclusion: the radioisotopes had attractive possibilities in industrial and medical radiography, emitting almost pure gamma rays or X-rays (photons) in the low energy range of 30 to 100 kev.

The transition from research to hardware came through two key developments. First, cermet pellets were fabricated using only a few milligrams of the rare earth oxides. Then the irradiated pellets were packaged in special bullet-size holders.

The resulting small, sealed radiographic sources are now being field and laboratory tested. Two excellent applications: "inside-out" checks of hollow shapes inaccessible to X-ray tubes, and radiography of thin steel sections and low density materials such as aluminum or human bone. For example, a recent medical milestone was a chest radiograph of a living person made with a Sm^{153} source. The portable exposure unit to shield the source weighed only 18 pounds.

This isotope radiography program is but one example of the work underway in GM Research's modern isotope laboratory — work that means, through science, "more and better things for more people."

General Motors Research Laboratories
Warren, Michigan



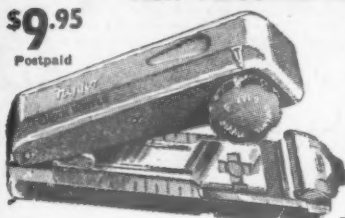
Sm^{153} exposure unit.

PROTECT YOUR CHECKS AGAINST FRAUD

NEW PERSONAL AUTOMATIC CHECKWRITER

\$9.95

Postpaid



Prints indelibly, perforates amount of check . . .
Complete with supplies and carrying case.

Now you can have low cost absolute check protection. This check-writer does the same job as office type machines which cost many times more. A necessity for any one who has a check account. Protect your personal account as well as your business account. Ideal for home use. Precision construction, weighs but 10 ounces, can be carried in pocket or purse.

★ ★ THE SUM \$9.95 & 95 CTS ★ ★
Imprints Any Amount

John Surray, Ltd.,

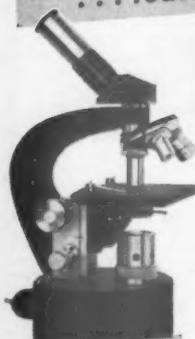
11 West 32nd St., Dept. SN-65, New York 1, N. Y.

SCIENCE COLOR FILM PROCESSING SERVICE

Fast, convenient service that guarantees you finest quality, genuine Kodak laboratory processing right here in Rochester. For Kodachrome, Ektachrome, Kodacolor. All sizes, including 35 mm. Movie, stereos, slides, prints, enlargements. Ansco color films handled too. Special customer services. Security Processing for Classified Films brings slides or prints direct from Kodak labs. Special quantity discounts on fresh, factory-packed color film. Write for complete catalog or send exposed film for quick test of our service.

FASCOLOR • Rm 64 Fulmar Bldg.
BOX 86—ROCHESTER 1, N. Y.

UNITRON'S Model MSA makes teaching easier . . . learning faster!



Here is a teaching microscope with built-in features to aid the instructor and student, yet priced for school budgets.

- Included prismatic eyepiece rotates 360° permitting two students or teacher and student to share the instrument
- Built-in low-voltage illuminating system, fluid condensing lens transformer conveniently housed in base . . . accessory mirror included . . . cabinet
- Substage condenser with aperture iris diaphragm assures correct and brilliant illumination at all powers . . . filter on swing-out mount
- All metal construction with durable black and chrome finish
- Low positioned coarse and fine focusing controls with protective stops to prevent damage to objectives or slides
- Three parfocal achromatic objectives 4X, 10X, 40X: professional quality with full numerical aperture . . . triple nosepiece . . . three eyepieces 5X, 10X, 15X available magnifications — 20X, 40X, 50X, 60X, 100X, 150X, 200X, 400X, 600X

\$107

Only F. O. B. Destination

In lots of 25 — only \$94.16 FREE 10-DAY TRIAL

UNITRON

INSTRUMENT DIVISION of UNITED SCIENTIFIC CO.
204-206 MILK STREET • BOSTON 9, MASS.

Please rank UNITRON'S Microscope Catalog 53-B

Name _____
Company _____
Address _____
City _____ State _____

Best Book Contest For 1960

\$1600 Cash Awards plus 40% return. All types of manuscripts invited. For Contest rules and details of famous publishing plan, write for free brochure SN. Pageant Press, 101 Fifth Ave., N. Y. 3



Buy All Your Books This Convenient Way!

Science Service will fill your order for any U. S. book in print at regular retail prices. Postage prepaid. Send orders and remittances to Book Department

SCIENCE SERVICE
1719 N Street, N.W.
Washington 6, D. C.

MICRO-ADS

Equipment, supplies and services of special interest to scientists, science teachers and students, science-minded laymen and hobbyists. 25¢ per word, payable in advance. Closing date 8 weeks prior to publication (Saturday).

SNL, 1719 N St., N.W., Washington 6, D. C.

ATOMIC THEORY

THE STRUCTURE OF THE ATOM—23 PAGES with many diagrams. A new concept of the atom, based upon the Kraft-Hillenberg theory of particle structure. Price 25 cents pp. C. F. Kraft, 218 Columbia Road, Annandale, Virginia.

CHEMICALS & APPARATUS

CHEMICALS IN SMALL QUANTITIES, LAB APPARATUS & GLASSWARE. Telescopes & Microscopes. Catalog 25¢. Bio-Chemical Products, 30 S. Somerset, Belmont 78, Massachusetts.

GOVERNMENT SURPLUS

GOVERNMENT SURPLUS RADIOS, RECEIVERS, transmitters, gadgets, parabolic reflectors, infra-red sniperscopes, aircraft camera lenses. Amazing catalog 10¢. John Melms, Malden 48, Mass.

RADIOACTIVE ISOTOPES

RADIOACTIVE ISOTOPES—AS LOW AS \$3.00. Free Price List \$140. Also, Radioactive Isotope Experiments, \$1.00. Atomic Research Laboratory, 10717 Venice Boulevard, Los Angeles 34, California.

MISCELLANEOUS

BINDERS FOR SALE—BUFF-COLORED BUCKRAM. Snap-in metal strips hold 52 copies. \$4.00 pp. Send orders with remittance to Science News Letter, 1719 N Street, N.W., Washington 6, D. C.

Books of the Week

(Continued from page 252)

human biology, including embryological and psychological material.

INACTIVATION OF VIRUSES—Ernest C. Pollard, Ed.—N.Y. Acad. of Sciences, Annals, Vol. 83, Art. 4, 247 p., illus., paper, \$5. Brings together present-day knowledge on the inactivation of viruses biologically, chemically and physically.

INDIANS OF THE PLAINS—Eugene Rachlis with John C. Ewers—American Heritage (Golden Press), 154 p., illus., \$3.50. Colorful story of North American Indians of the Great Plains.

AN INTRODUCTION TO ANIMAL BIOLOGY—Dale C. Braungart and Rita Buddeke—Mosby, 5th rev. ed., 416 p., illus., \$6.25. Text suitable for one- or two-semester course in zoology.

KETTERING: Master Inventor—Sigmund A. Lavine—Dodd, 173 p., photographs, \$3. Biography of an imaginative engineer and scientist.

LEADERSHIP AND CULTURAL CHANGE IN PALAU—Roland W. Force—Chicago Nat. Hist. Mus., 211 p., illus., paper, \$5. Study based on anthropological field work in the Palau Islands of Micronesia.

LEARNING TO TALK: A Parents' Guide for the First Five Years—Margaret C. L. Greene—Harper, 90 p., illus. by Jill Hassell, \$2.50. Tells what parents may expect in speech development at each age level.

THE LEGUMES OF TEXAS—B. L. Turner—Univ. of Texas Press, 284 p., maps, \$6. Taxonomic survey of legume species, their variability, and distribution.

THE MECHANICS OF AEROSOLS—N. A. Fuks, transl. from Russian by E. Lachowicz—U.S. Army Chemical Warfare Labs. (OTS), 460 p., paper, \$7.50. Review of Russian literature on aerosols in such fields as meteorology, botany, soil conservation, nuclear physics, insecticides and industrial waste control.

THE MIND OF THE MURDERER—Manfred S. Guttmacher—Farrar, Straus, 244 p., \$4.50. A psychiatrist discusses case histories of murderers, expert and psychiatric testimony, and the physician's right to maintain medical secrecy. (See p. 248)

Science News Letter, April 16, 1960

Questions

CHEMISTRY—How large a percentage of the Soviet people are said to have had a 10-hour anti-air defense course? p. 243.

ROCKETS AND MISSILES—What is the size of the base of Tiros 1? p. 246.

Photographs: Cover, Radio Corporation of America; p. 245, McDonnell Aircraft; p. 246, National Aeronautics and Space Administration; p. 247, Harvard University; p. 250, U.S. Fish and Wildlife Service; p. 256, Safeguard Corporation.

Do You Know

Russia currently is reported to be producing about 16% (in value) of the world's total mineral products, while the U.S. produces about 30%.

U.S. production of iron ore in 1959 went down to 60,000,000 tons, the lowest in 20 years.

Make over 200 Small
Computing and Reasoning
Machines with . . .

NEW 1959-60 ELECTRIC BRAIN CONSTRUCTION KIT

EQUALS THE ORIGINAL GENIAC® electric brain construction kit (1955) PLUS many improvements and additions: over 600 parts—including 116 improved patented wipers so that all switches work well. Instead of covering only 38 machines, the BRAINIAC K18 Kit gives full specifications for 201 computing, reasoning, arithmetical, logical, puzzle-solving and game-playing machines . . . all 33 GENIACS (1955), 13 Tyniacs (1956), and 155 BRAINIACS (1957-58-59), etc.

THIS IS BRAINIAC! With our Brainiac Kit K18, you can build over 200 small electric brain machines and toys which "think," compute, reason, and display intelligent behavior. Each one works on a single flashlight battery . . . is FUN to make, FUN to use and play with, and TEACHES you something new about electrical computing and reasoning circuits. All connections with nuts and bolts—no soldering required. Originated by Berkeley Enterprises, the Brainiac K18 kit is the result of 10 years' design and development work with miniature mechanical brains including: Geniac (see "Geniacs: Small Electric Brain Machines and How to Make Them" by Edmund C. Berkeley, 64 pp., published by Geniac Project, a partnership with Oliver Garfield discontinued September 1955), Tyniac (1956), Relay Moe (automatic relay machine playing tit-tat-toe—pictured in Life Magazine, March 19, 1956), Simon (miniature automatic digital computer with 129 relays—see "Simple Simon" by E. C. Berkeley in Scientific American, November 1, 1950), Squee (electronic robot squirrel—see "Light Sensitive Electronic Beast" by E. C. Berkeley in Radio Electronics, December 1951), etc.

PROGRAMMING YOUR OWN PROBLEMS FOR THE BRAINIAC

The Brainiac is the smallest and lowest-cost semi-automatic, general-purpose digital computer existing. Many problems in ALL fields of knowledge and business can be programmed for the Brainiac—to the extent that a number of versatile multiple switches can express the problem. We shall be glad to program YOUR OWN problems. Write us—no charge for simple problems, modest charge for complicated ones.



WHAT CAN YOU MAKE WITH BRAINIAC KIT K18? Over 200 machines including—LOGIC MACHINES: Syllogism Prover, Intelligence Test, Boolean Algebra Circuits, Douglas MacDonald's Will Analyzer, A Simple Kalin-Burkhart Logical Truth Calculator, Diagnosing Motor Car Trouble, etc. GAME-PLAYING MACHINES: Tit-Tat-Toe, Nim, Wheeled

Bandit, Black Match, Sundorra 21, etc. COMPUTERS: To add, subtract, multiply or divide using decimal or binary numbers, Forty-Year Calendar, Prime Number Indicator, Money-Changing Machine, etc. CRYPTOGRAPHIC MACHINES: Coders, Decoders, Lock with 15,000,000 Combinations, etc.

PUZZLE-SOLVING MACHINES: The Missionaries and the Cannibals, Age-Guessing Machine, Submarine Rescue Chamber, Daisy Petal Machine, Fox-Hen-Corn & Hired Man, Uranium Space Ship and the Space Pirates, The Three Monkeys Who Spurned Evil, General Alarm at the Fortress of Dreaddeerie, etc. QUIZ MACHINE: How to Tell an Aardvark from an Armadillo, The Waxing and the Waning Moon, Polar Air Routes, history, geography, trigonometry, grammar, statistics, calculus, etc.

WHO IS EDMUND C. BERKELEY? Author of *Giant Brains or Machines That Think*, Wiley, 1949, 270 pp. (15,000 copies sold); Author of *Computers: Their Operation and Applications*, Reinhold, 1954, 366 pp.; Author of *Symbolic Logic and Intelligent Machines*, Reinhold, 1959, 203 pp.; Editor & Publisher of the magazine, *Computers and Automation*; Maker and Developer of small robots; Fellow of the Society of Actuaries; Secretary (1947-55) of the Association for Computing Machinery; Designer of all the Tyniacs and Brainiacs, more than half of the 33 Geniacs (1955); Designer of the patented Multiple Switch Disc and other features in the 1955 Geniac kit.

BRAINIAC KIT (1959-60 MODEL) K18 . . . the kit with limitless possibilities—backed by an organization of 12 years standing in the computer field—\$18.95. (For shipment west of Mississippi, add 80¢; outside U.S., add \$1.80.)

7-Day Full Refund Guarantee If Not Satisfactory

MAIL THIS COUPON OR A COPY OF IT

BERKELEY ENTERPRISES, Inc.

815 Washington St., R216, Newtonville 60, Mass.
Please send me Brainiac Kit K18. (Returnable in 7 days for full refund if not satisfactory—if in good condition.) I enclose \$_____ in full payment.

My name and address are attached

WHAT COMES WITH YOUR BRAINIAC K18 KIT—

Complete Plans, Instructions, Explanations & Hardware:

- Every part needed to build Geniacs, Tyniacs, Brainiacs—over 600 pieces including control panel, multiple switch discs, jumpers, improved wipers, bulbs, sockets, washers, wire, battery and special tools.
- Complete descriptions of 201 experiments and machines.
- Over 170 circuit diagrams including 46 exact wiring templates.
- Manual "Brainiacs—Small Electric Brain Machines—Introduction and Explanation" by Edmund C. Berkeley, 1959.
- "Introduction to Boolean Algebra for Circuits and Switching" by Edmund C. Berkeley.
- "How to Go from Brainiacs and Geniacs to Automatic Computers" by Edmund C. Berkeley.
- List of references to computer literature including "Minds and Machines" by W. Sluckin, published by Penguin Books (Baltimore), 1954, 233 pages, and other references.

only **\$18.95** . . . MORE VALUE • MORE FEATURES

New Machines and Gadgets

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 1035. To receive this Gadget Bulletin without special request each week, remit \$1.50 for one year's subscription.

FM-AM ALL-TRANSISTOR PORTABLE, the manufacturer says, is the first American-made radio of its type and has an undistorted power output rated at 500 milliwatts or 92% greater than that of any tube-type portable sold. A control circuit to prevent FM drift is built in. A jack permits a phonograph to be played through the set or the portable to be used as an FM-AM tuner with a console radio.

Science News Letter, April 16, 1960

"DRY" INK SET permits children to paint, color eggs and draw greeting cards with a minimum of mess for there is no loose ink. The set has eight colors in bottles with six different shapes of felt tips that absorb the ink. To use, the bottle is inverted and the tip pressed to paper.

Science News Letter, April 16, 1960

CHILDREN'S BOAT, for use in swimming pools, holds two or three children but is light enough for a child to carry unassisted. Designed to be unsinkable and unbreakable, the boat is 5½ feet long and formed from plastic.

Science News Letter, April 16, 1960

PERMANENT AIR FILTER, shown in the photograph, eliminates the need to buy a new air conditioner filter each time an old one gets dirty. Made of a polyurethane foam, the new filter may be washed and re-installed. The 15x24 inch



filter may be trimmed with scissors to fit various makes of air conditioners.

Science News Letter, April 16, 1960

CORROSION INDICATORS corrode at the slightest provocation, turning reddish-brown to warn that conditions exist that might damage delicate instruments or other metal products. Only as big as a pat of

butter, each indicator has a thin film of metal that shows a corrosion of only five billionths of an inch of metal, the manufacturer states.

Science News Letter, April 16, 1960

LOUNGE CHAIR PAD is an unusual air mattress with plastic foam added in a patented arrangement. A small air valve permits the lounge to adjust his pad to the desired softness by letting air in or out. The lounge does not have to blow the pad up, as in regular air mattresses, because the air foam expands when the air valve is open and no pressure is on the pad. The pad's vinyl cover is waterproof so the pad may also be used as a pool float.

Science News Letter, April 16, 1960

POCKET PRUNER is ready for garden chores at the flick of a green thumb but folds like a regular pocket knife for convenient carrying. From one end of the tool a small pruning shear unfolds and from the other, a pruning knife.

Science News Letter, April 16, 1960

ELECTRIC ERASER rotates a rubber eraser for neat corrections by typists and draftsmen. Because rotation, not pressure, does the trick, no slip sheets between carbons are said to be needed. And because the eraser tip is automatically kept pointed, a typing shield is not needed either.

Science News Letter, April 16, 1960



Nature Ramblings



By HORACE LOFTIN

THE ARRIVAL of spring—reluctant as it has been this year—is signed and certified by the appearance of blossoms in woods, fields and gardens across the country.

The definition of a flower depends on the point of view. To the honeybee, it is an overflowing cup of liquid food. To the poet, it is a source of inspiration. To the person allergic to pollen, the flower is a diabolical instrument of torture.

And to the botanist, a flower is a modified stem bearing a concentric circle of leaves specialized for reproduction! If you are not in the unhappy position of the allergic pollen-avoider, pick one of these springtime blossoms and examine its handsomely designed, and functional, structure.

A typical flower consists of four circles of modified leaves mounted on a swollen base called the receptacle. Look first at the petals. These make up the second whirl of

What Is a Flower?



modified leaves. Now look just below the petals and you should see a whirl of smaller green, leaf-like structures. These are the sepals, representing the first circle of modified leaves. The enlarged portion of the flower to which the sepals and petals are attached is the receptacle. The sepals usually function to protect and support the other flower parts. The petals may do likewise, but often their primary function is to attract pollen-carrying insects.

Within the circle of petals, two other groups of delicate structures can usually be seen, though some flowers may have only one or the other of them, depending on whether they are "male" or "female" or whether they bear both "sexes." Nearest the petals is a whirl of small, stalked bodies, the stamens. These produce the "male" pollen grains in the enlarged sacs (anthers) on the tip of the stalk. Although their looks belie the fact, they are modified leaves, too.

In the center of the flower is another whirl of stalked bodies called pistils. Or there may be a single body, representing several pistils fused together. This is the "female" organ, and within its swollen base (ovary) lie one or more unfertilized eggs.

Pollen grains carried by insects or wafted by the wind fall on the tip of the pistil. A pollen grain then sends forth a tube that penetrates the pistil stalk until it reaches the egg. Then a nucleus in the pollen tube fertilizes the egg. The net result is a seed.

Science News Letter, April 16, 1960